

PATENT

Attorney Docket No. 401171/FUKAMI

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

AGA et al.

Art Unit: Unknown

Application No.: Unknown

Examiner: Unknown

Filed: April 20, 2001

For: EPOXY RESIN
COMPOSITION,
SEMICONDUCTOR
DEVICE, AND METHOD
OF JUDGING
VISIBILITY OF LASER
MARK

PRELIMINARY AMENDMENT

Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

Prior to the examination of the above-identified patent application, please enter the following amendments and consider the following remarks.

IN THE SPECIFICATION:

Replace the paragraph beginning at page 1, line 6 with:

The present invention generally relates to an epoxy resin composition for sealing a semiconductor device, and more specifically to a semiconductor sealing epoxy resin composition providing excellent visibility of a laser mark and having excellent fluidity characteristics. The present invention also relates to a semiconductor device that uses such a semiconductor sealing epoxy resin composition. The present invention further relates to a method of judging the visibility of a laser mark.

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Replace the paragraph beginning at page 1, line 28 with:

However, such a marking and its curing require a lot of time, and also it is not easy to handle with the ink, so that an increasing number of manufacturers have adopted a laser mark 6.

Replace the paragraph beginning at page 2, line 3 with:

Further, although there have been some reports on improvement in the visibility of a laser mark, they are not reported as quantitative values, and it is not clear whether they are good or poor.

IN THE CLAIMS:

Replace the indicated claims with:

1. (Amended) An epoxy resin composition that seals a semiconductor chip, wherein a color difference between a color of said epoxy resin and a color of a standard substance stored in a colorimeter has a value of at least 30.

2. (Amended) An epoxy resin composition that seals a semiconductor chip, said epoxy resin composition including an epoxy resin and a filler that fills said epoxy resin, wherein said filler contains from 10 to 15 wt%, with respect to total filler, of a filler component having an average particle size of no more than 10 μm .

3. (Amended) A semiconductor device including:
a semiconductor chip;
a package of an epoxy resin encapsulating said semiconductor chip; and
a laser mark printed on a surface of said package, wherein a color difference between a color of said laser mark and a color of the surface of said package where the laser mark is not present, as measured by a colorimeter, has a value of at least 10.

5. (Amended) A semiconductor device including:
a semiconductor chip;
a package of an epoxy resin encapsulating said semiconductor chip; and

a laser mark printed on a surface of said package, wherein a color difference between a color of said epoxy resin and a color of a standard substance stored in a colorimeter has a value of at least 30.

6. (Amended) A semiconductor device including:
a semiconductor chip;
a package of an epoxy resin encapsulating said semiconductor chip; and
a filler that fills said epoxy resin, wherein said filler contains from 10 to 15 wt%, with respect to total filler, of a filler component having an average particle size of no more than 10 μm .

7. (Amended) A method of judging visibility of a laser mark printed on a surface of a package of a semiconductor device, the package being an epoxy resin, said method including:

measuring a color difference value between a color of the laser mark and a color of the surface of said package where the laser mark is not present, with a colorimeter; and
judging whether the color difference value is at least 10.

IN THE ABSTRACT:

Replace the Abstract with:

ABSTRACT OF THE DISCLOSURE

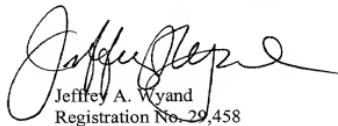
A semiconductor device that uses a semiconductor sealing epoxy resin composition excellent in visibility for laser marking and in fluidity characteristics. A semiconductor chip is sealed with a package of an epoxy resin. A laser mark is printed on a surface of the package. The color difference between the color of the laser mark and the color of the surface of the package where the laser mark is not present, as measured by a colorimeter, has a value of at least 10.

REMARKS

The foregoing Amendment corrects translational errors and conforms the claims to United States practice.

Respectfully submitted,

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**SPECIFICATION, CLAIMS AND
ABSTRACT AS PRELIMINARILY AMENDED**

Amendments to the paragraph beginning at page 1, line 6:

The present invention generally relates to an epoxy resin composition for sealing a semiconductor device, and more specifically to a semiconductor sealing epoxy resin composition being providing excellent in visibility of a laser mark and in having excellent fluidity characteristics. The present invention also relates to a semiconductor device that uses such a semiconductor sealing epoxy resin composition. The present invention further relates to a method of judging the visibility of a laser mark.

Amendments to the paragraph beginning at page 1, line 28:

However, such a marking and its curing require a lot of time, and also it is not easy to handle with the ink, so that ~~there is~~ an increasing number of manufacturers ~~that~~ adopt have adopted a laser mark 6.

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Amendments to the paragraph beginning at page 2, line 3:

Further, although there ~~has have~~ been some reports on improvement in the visibility of a laser mark, they are not ~~shown in reported as~~ quantitative values, and it is not clear whether they are good or poor.

Amendments to existing claims:

1. (Amended) An epoxy resin composition that seals a semiconductor chip, wherein a color difference between a color of said epoxy resin and a color of a standard substance stored in a colorimeter ~~shows has~~ a value of ~~at least~~ 30-~~or more~~.

2. (Amended) An epoxy resin composition that seals a semiconductor chip, said epoxy resin composition including an epoxy resin and a filler that fills ~~an inside of~~ said epoxy resin, wherein said filler contains from 10 to 15 wt%, ~~with respect to total filler~~, of a filler component having an average particle size of ~~no more than~~ 10 μm or less ~~with respect to total filler components~~.

3. (Amended) A semiconductor device including:
a semiconductor chip;
a package ~~formed~~ of an epoxy resin ~~that seals~~ encapsulating said semiconductor chip; and

a laser mark printed on a surface of said package, wherein a color difference between a color of said laser mark and a color of the surface of said package where the laser mark is not ~~formed~~ present, as measured by ~~means of~~ a colorimeter, ~~shows has~~ a value of ~~at least~~ 10-~~or more~~.

5. (Amended) A semiconductor device including:
a semiconductor chip;
a package ~~formed~~ of an epoxy resin ~~that seals~~ encapsulating said semiconductor chip; and

a laser mark printed on a surface of said package, wherein a color difference between a color of said epoxy resin and a color of a standard substance stored in a colorimeter ~~shows has~~ ~~has~~ a value of at least 30 ~~or more~~.

6. (Amended) A semiconductor device including:

a semiconductor chip;

a package ~~formed~~ of an epoxy resin ~~that seals~~ ~~encapsulating~~ said semiconductor chip; and

a filler that fills ~~an inside of~~ said epoxy resin, wherein said filler contains from 10 to 15 wt%, ~~with respect to total filler~~, of a filler component having an average particle size of no more than 10 μm ~~or less with respect to total filler components~~.

7. (Amended) A method of judging ~~a~~ visibility of a laser mark printed on a surface of a package ~~in of~~ a semiconductor device ~~sealed with~~, the package ~~formed of~~ ~~being~~ an epoxy resin, said method including ~~the steps of~~:

measuring a color difference value between a color of ~~said the~~ laser mark and a color of the surface of said package where the laser mark is not ~~formed present, by means of~~ ~~with~~ a colorimeter; and

judging whether ~~said the~~ color difference value ~~shows a value of~~ ~~is at least~~ 10 ~~or more~~.

Amendments to the abstract:

ABSTRACT OF THE DISCLOSURE

A ~~principal object is to provide a~~ semiconductor device that uses a semiconductor sealing epoxy resin composition ~~being~~ excellent in visibility ~~of a~~ ~~for~~ laser mark marking and in fluidity characteristics. A semiconductor chip is sealed with a package ~~formed~~ of an epoxy resin. A laser mark is printed on a surface of the package. The color difference between the color of the laser mark and the color of the surface of the package where the laser mark is not ~~formed present, as measured by means of~~ a colorimeter, ~~shows has~~ a value of at least 10 or more.

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CLAIMS PENDING AFTER PRELIMINARY AMENDMENT

1. An epoxy resin composition that seals a semiconductor chip, wherein a color difference between a color of said epoxy resin and a color of a standard substance stored in a colorimeter has a value of at least 30.
2. An epoxy resin composition that seals a semiconductor chip, said epoxy resin composition including an epoxy resin and a filler that fills said epoxy resin, wherein said filler contains from 10 to 15 wt%, with respect to total filler, of a filler component having an average particle size of no more than 10 μm .
3. A semiconductor device including:
 - a semiconductor chip;
 - a package of an epoxy resin encapsulating said semiconductor chip; and
 - a laser mark printed on a surface of said package, wherein a color difference between a color of said laser mark and a color of the surface of said package where the laser mark is not present, as measured by a colorimeter, has a value of at least 10.

4. The semiconductor device according to claim 3, wherein said package is colored with a dye.

5. A semiconductor device including:

a semiconductor chip;
a package of an epoxy resin encapsulating said semiconductor chip; and
a laser mark printed on a surface of said package, wherein a color difference between a color of said epoxy resin and a color of a standard substance stored in a colorimeter has a value of at least 30.

6. A semiconductor device including:

a semiconductor chip;
a package of an epoxy resin encapsulating said semiconductor chip; and
a filler that fills said epoxy resin, wherein said filler contains from 10 to 15 wt%, with respect to total filler of a filler component having an average particle size of no more than 10 μm .

7. A method of judging visibility of a laser mark printed on a surface of a package of a semiconductor device, the package being an epoxy resin, said method including:

measuring a color difference value between a color of the laser mark and a color of the surface of said package where the laser mark is not present, with a colorimeter; and
judging whether the color difference value is at least 10.